

Amended Specification Paragraphs:

In the paragraph starting on page 2, line 14:

One example is a group of [a readily demountable connection is] rigid pins of one electronic component being received by resilient socket elements of another electronic component. The socket elements exert a contact force (pressure) on the pins in an amount sufficient to ensure a reliable electrical connection therebetween. Another type of readily demountable connection are interconnection elements (also referred to herein as springs, spring elements, spring contacts or spring contact elements) that are themselves resilient, springy, or mounted in and/or on a spring medium. An example of such a spring contact element is a needle of a probe card component. Such spring contact elements are typically intended to effect temporary pressure connections between a component to which they are mounted and terminals of another component, such as a semiconductor device under test.

In the paragraph starting on page 3, line 21,

There are a number of problems associated with achieving the above-described electrical contact. First, as the terminal contact areas also get smaller, the horizontal movement of the tip structure 10 becomes an issue. Second, as the tip structure 10 is forced to deflect across the terminal (see Figure 1B), it may also be forced down and away from the terminal causing the blade 14 of the tip structure 10 to rotate away from the terminal[as the tip structure 10 deflects across the terminal]. The rotation of the blade 14 away from the terminal of the electronic component under test reduces the chances of the tip structure achieving a dependable electrical contact with the terminal of the electronic component. Further, as the tip structure scrapes across the non-conductive surface of the terminal in an effort to penetrate the nonconductive surface and establish a good electrical contact, stray particles and buildup often occur along the blade 14 and upper surface of the tip structure 10. This buildup may contribute to high contact resistance between the tip structure and the terminal, which may cause inaccurate voltage

B

levels during device testing due to the voltage produced across the tip structure. The inaccurate voltage levels may cause a device to incorrectly fail, resulting in lower test yields when the contact is used in a device testing environment.

In the paragraph starting at page 7, line 15:

Figure 5H is a cross-sectional view of a cantilevered tip structure as may be mounted to a raised interconnection element[illustrated in Figure 5D].

In the paragraph starting at page 12, line 8:

The parallel orientation of the blade 22 also provides a more reliable electrical connection with the terminal of the electronic component under test. As electronic component terminals become smaller, any movement by the blade becomes significant as the possibility increases that any movement will move the blade outside of the terminal such that the blade will be unable to establish an electrical contact with the terminal. As shown in Figures 1B and 2C, the deflection of the tip structure (10, 20) across the terminal may depend on both the interconnection element's material and shape. In one embodiment, the tip structure deflects along a substantially rotational path having both a lateral (or horizontal) and a vertical component to the motion resulting in both a lateral deflection and a vertical deflection as the tip structure (10, 20) is pushed down and away from the terminal. It is possible[,] that the perpendicularly oriented blade 14 will be pushed outside of the terminal contact area as a result of the rotational movement of the tip structure 10. In contrast, as the tip structure 20 deflects across the terminal, even if part of the blade 22 is moved outside of the terminal contact area, the remaining length of the blade 22 (the trailing end) continues to be within the terminal contact area. Likewise, even as the front end of blade 22 is forced to rotate down and away from the terminal contact area, the trailing end of the blade 22 will remain in contact with the terminal surface. In this manner, the parallel oriented blade 22 of the present invention [inventor]

provides a more reliable electrical connection (or interface) with the terminal of the electrical component under test.

In the paragraph starting at page 14, line 12:

Figure 3A illustrates what is perhaps the simplest of spring shapes for an interconnection element of the present invention, namely, a straight cantilever beam oriented at an angle to a force as indicated by the arrow labeled "F" applied at its tip 310b[110b]. When such a contact force (pressure) is applied by a terminal of an electronic component to which the interconnection element is making a pressure contact, the downward (as viewed) deflection of the tip will result in the tip moving across the terminal, in a "wiping" motion. Such a wiping contact ensures a reliable contact being made between the interconnection element and the contacted terminal of the electronic component. The deflection (resiliency) of the interconnection element in general is determined in part by the overall shape of the interconnection element, in part by the dominant (greater) yield strength of the overcoating material (versus that of the core), and in part by the thickness of the overcoating material.

In the paragraph starting at page 22, line 3:

Once layers 506 and 508 are deposited, a masking material 510 (illustrated in Figure 5C), such as photoresist, is applied to define a plurality of openings for the fabrication of tip structures. The openings in the masking layer 510 define a region around the trenches 504. First, a contact metal 512 is deposited, typically having a minimum thickness of approximately 0.5 mil. This contact metal may be deposited by sputtering, CVD, PVD, or plating. In one embodiment of the present invention, the contact metal 512 is comprised of Palladium-Cobalt. Other materials may also be used for contact metal 512, including but not limited to, palladium, rhodium, tungsten-silicide, tungsten, or diamond. Next, layer 514 comprised of a spring alloy material (such as nickel and its alloys) is optionally deposited (such as by plating) to increase [crease] the bulk of the tip structure. Layer 514 typically has an approximate thickness of 0 – 2 mils. Over layer 514, a layer 516 is deposited comprising

a material amenable to brazing or soldering, in the event that the spring alloy is not easy to bond, solder or braze to. The spring alloy layer 514 is deposited by any suitable means such as plating, sputtering, or CVD. Finally, a Au-Braze joining layer 516 is deposited. The Au-Braze layer is specific to an AuSn braze attach.

In the paragraph starting at page 19, line 15:

Figure 5A illustrates a sacrificial substrate 502, such as a wafer of monocrystalline silicon, into a surface of which a plurality (one of many shown) of trenches 504 are etched. A patterned masking layer, such as a photoresist (not shown), is first patterned on the substrate 50 to define the length and width of the trench 504. Next, the trench 504 is formed in the substrate 504. In the preferred embodiment, a potassium hydroxide (KOH) selective etch is performed between the 111 and 001 crystal orientation.

In the paragraph starting at page 23, line 18:

Figure 5H illustrates the tip structure 520 as shown in Figure 5D prior to being mounted [mounting of the tip structure 520 shown in Figure 5D] to raised interconnection elements 530 extending (e.g., free-standing) from corresponding terminals (one of many shown) 532 of an electronic component 534 (interconnection elements 530, terminals 532 and electronic component 534 are not shown in Figure 5H). In this embodiment of the present invention, the solder paste or brazing material used to mount the tip structure 520 to the interconnection element 530 is positioned within the divot 523. The end result is a mounted tip structure similar to that illustrated in Figures 5F and 5G, with the interconnection element affixed to the divot 523 rather than a flat back section (see 521 of Figure 5F). Using the divot formed when fabricating the blade 522 aids in positioning the solder paste or brazing material and provides a more reliable method of forming the mechanical connection between the interconnection element 530 and the foot of the tip structure 520.